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ABSTRACT

This paper outlines a plan to assess the effectiveness of individually guided education (IGE) in American elementary schools. The evaluation plan is based on a framework that identifies variables and relationships among variables in four categories: IGE support system components, pupil and staff background, means of instruction, and pupil and staff outcomes. The proposed investigation is divided into four phases. The first phase is a 100-school survey, the second is a follow-up and extension study, the third is an intensive study of the degree of reform and renewal in IGE schools, and the last phase is an examination of the use and effectiveness of two curriculum products of the Wisconsin Research and Development Center for Cognitive Learning. Together the four phases of the investigation are intended to identify the characteristics of successful schooling as designed for and practiced in IGE elementary schools. (Author/JM)

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Working Paper No. 183

IGE EVALUATION: PERSPECTIVES AND A PLAN

by

Thomas A. Romberg

Report from the Project on
Organization for Instruction and
Administrative Arrangements

Wisconsin Research and Development
Center for Cognitive Learning
The University of Wisconsin
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WISCONSIN RESEARCH AND DEVELOPMENT CENTER FOR COGNITIVE LEARNING

MISSION

The mission of the Wisconsin Research and Development Center for Cognitive Learning is to help learners develop as rapidly and effectively as possible their potential as human beings and as contributing members of society. The R&D Center is striving to fulfill this goal by

- conducting research to discover more about how children learn
- developing improved instructional strategies, processes and materials for school administrators, teachers, and children, and
- offering assistance to educators and citizens which will help transfer the outcomes of research and development into practice

PROGRAM

The activities of the Wisconsin R&D Center are organized around one unifying theme, Individually Guided Education.

FUNDING

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ABSTRACT

In this paper a plan to assess the effectiveness of the implementation of Individually Guided Education (IGE) in American elementary schools is outlined. The plan is based on a framework that identifies variables and relationships among variables in four categories: Support system components, pupil and staff background, means of instruction, and pupil and staff outcomes. The proposed investigation has been divided into four phases. The first phase is a 100-school survey; the second a follow-up and extension study; the third, an intensive study of the degree of reform and renewal in IGE schools. The last phase is an examination of the use and effectiveness of the two primary curriculum products of the Center, the Wisconsin Design for Reading Skill Development and Developing Mathematical Processes. Together the four phases of this investigation have been designed to identify the characteristics of successful schooling as designed for and practiced in IGE elementary schools.

I

AN OVERVIEW OF THE PROBLEM

> The Center's program of individually guided education in multi-unit schools may prove one of the most powerful and flexible sets of approaches yet devised for the continuing renewal of educational institutions and the facilitation of learning and teaching. It makes it possible to involve schools and other educational agencies in the problem-solving processes which are the essence of research and development. It promotes innovation, not as an end in itself, but as an answer to human needs [Chase, 1970, p. 2].

For more than a decade, the primary program of the Wisconsin Research and Development Center for Cognitive Learning has been Individually Guided Education (IGE). The Center's ability to marshall human and financial resources in an attempt to restructure elementary education in the United States is remarkable and has been pictured as a prime example of the utility of Federal financing of educational research and development.

Today (through the efforts of the Center, the Kettering Foundation and IGE coordinators in 29 states) well over 1500 elementary schools claim to be IGE schools. Unfortunately, no comprehensive picture of the extent or effectiveness of IGE implementation is now available. This is not to imply that evaluations of IGE have not been done. On the contrary,

Katzenmeyer and Ingison (in press) found approximately 50 different studies directed at evaluating various aspects of IGE. Each of these studies, however, dealt with parts of the IGE system and offer only glimpses of the impact of IGE. Also, more recently, an examination of responses to an IGE Schools Questionnaire returned in June 1976 clearly indicates substantial variance in affiliation, degree of utilization, use of the instructional programming model (IPM), subject matter selected for IPM implementation, staff organization, etc. (Zajano & Stewart, 1976). Obviously, the translation of IGE into practice has taken many forms. Thus, the purpose of this paper is to outline a plan to evaluate IGE so that both a comprehensive picture of the system in operation and its effectiveness can be determined. The picture should illuminate the features of IGE schools which have made them successful.

The Mainsprings of IGE

The design of such an evaluation plan is not easy. IGE is not a product like a washing machine to be judged simply by performance against competitors as in a consumer report. Rather it is a complex system based on theoretic and pragmatic ideas about schooling, children's learning, and the professional roles of school staffs. In essence, IGE is the result of a long, collaborative interplay of these ideas by various scholars and professional educators.

The conceptual mainsprings of IGE are reflected in the three words in its title: "education," "individually," and "guided." "Education" in IGE was chosen to reflect the idea that schooling should be an integral part of education. The school as a social agency should be purposive and directive, but its purposes should be broadly and culturally conceived. Thus, although cognitive objectives are to be the referents upon which schooling experiences are based, just meeting such a list of objectives is not sufficient. For example, learning "to comprehend a written passage" or "to write a mathematical expression for a particular situation" are typical referents upon which instruction is based. But, since schooling is to be related to one's overall education, other purposes such as "the development of high level conceptualizing skills"(Klausmeier, 1976) or "problem solving strategies" (Romberg, 1976) or "other abilities which enable pupils to continue to learn and have healthy self-concepts" (Klausmeier, 1976) are central to the purposes of an IGE school.

"Individually" in IGE was chosen to reflect that schooling should be directed toward each individual pupil. But, as the title of an IGE film proclaims, instruction should be "one at a time together." This implies, that while what an individual learns depends upon a specific learning experience, the experience usually will not be independent from others but rather as a part of a group activity with other children. Since

children differn in past experiences, motivation, readiness, rate, learning style, and expectations, they should not necessarily learn the same things at the same time or in the same way. Variation in objectives, in when objectives are learned, and in activities designed to teach these objectives is expected. Also, pupils are not simply passive recipients of information. Instead they are active problem solvers searching for information. Thus, what students do and how they do it are as important as what they learn. For it is through the means of instruction that outcomes are acquired.

"Guided" in IGE was chosen to reflect the teacher's professional role as pupils' guide for instruction. The teacher's role in IGE is succinctly specified in Steps 4, 5, and 6 of the IGE Instructional Programming Model (see Figure 1). Teachers are viewed as professional clinicians, motivating, observing, challenging, and varying instructional activities to meet the needs and characteristics of the pupils under their direction.

Finally, while the above beliefs about schooling, individuals, and teachers are held by many educators, IGE is unique in that its developers recognized that such beliefs can only be realized through the creation of a supportive environment. The Center, in collaboration with school personnel, has developed a unique form of school organization (the Multiunit school); curricular materials compatible with the IPM [such as Wisconsin Design for Reading Skill Development (Otto, 1976) and Developing Mathematical Processes (Romberg, 1976)]; and state, regional,

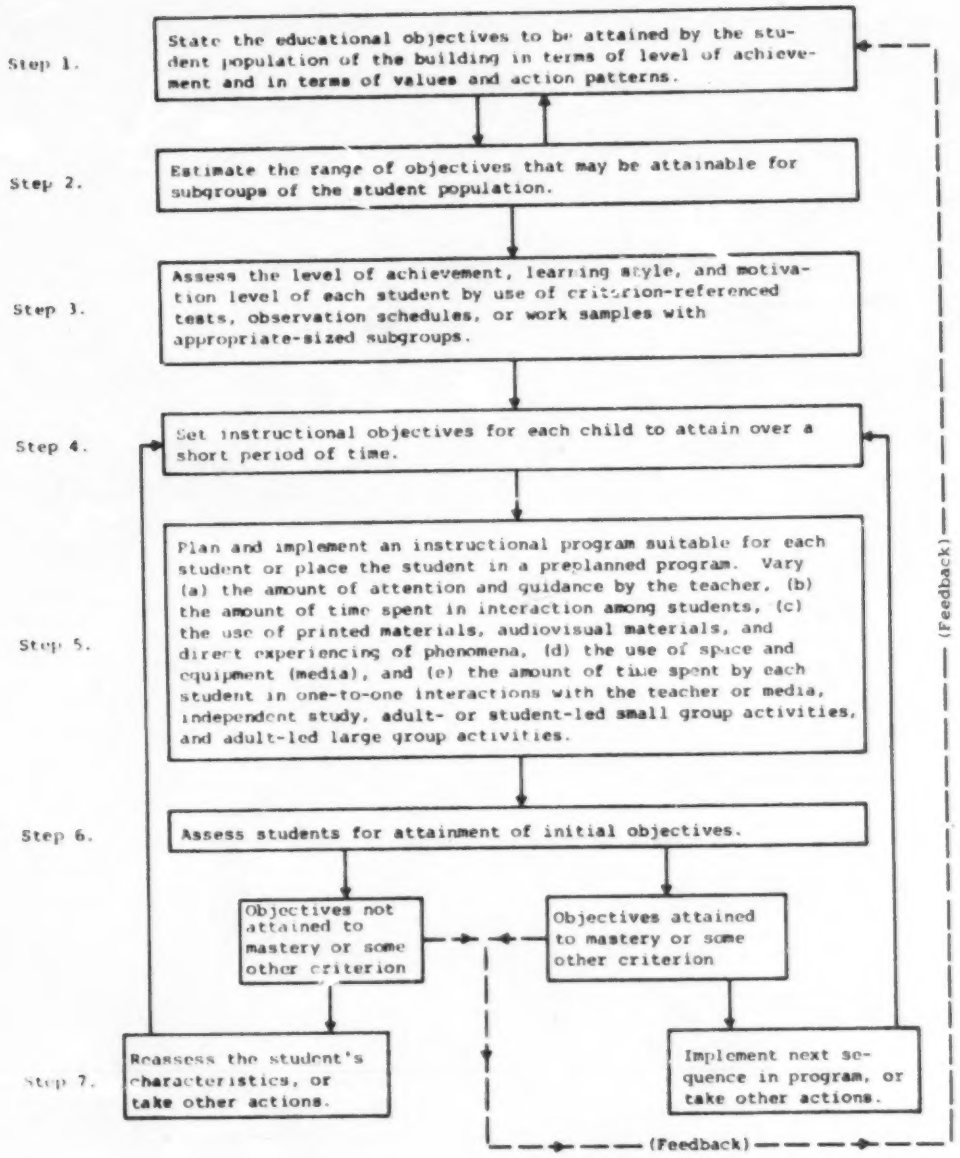
Step 1.
State the educational objectives to be attained by the student population of the building in terms of level of achievement and in terms of values and action patterns.
Step 2.
Estimate the range of objectives that may be attainable for subgroups of the student population.
Step 3.
Assess the level of achievement, learning style, and motivation level of each student by use of criterion-referenced tests, observation schedules, or work samples with appropriate-sized subgroups.
Step 4.
Set instructional objectives for each child to attain over a short period of time.
Step 5.
Plan and implement an instructional program suitable for each student or place the student in a preplanned program. Vary (a) the amount of attention and guidance by the teacher, (b) the amount of time spent in interaction among students, (c) the use of printed materials, audiovisual materials, and direct experiencing of phenomena, (d) the use of space and equipment (media), and (e) the amount of time spent by each student in one-to-one interactions with the teacher or media, independent study, adult- or student-led small group activities, and adult-led large group activities.
Step 6.
Assess students for attainment of initial objectives.
Objectives not attained to mastery or some other criterion
Objectives attained to mastery or some other criterion
Step 7.
Reassess the student's characteristics, or take other actions.
Implement next sequence in program, or take other actions.
(Feedback)
(Feedback)

Figure 1. Instructional Programming Model in IGE. (Adapted from Klausmeier, Quilling, Sorenson, Way, & Glasrud, 1971, p. 19.)

and national networks to prepare and reinstruct teachers, unit leaders, and principals. In fact, the networks have served both to facilitate the implementation of IGE in schools and to remove schools' dependency on the R & D Center. The components of IGE evolved and were clarified as needs arose and collaborative efforts were made to alleviate those needs. The seven basic components which have evolved are: the multiunit organization-administrative arrangements, instructional programming for the individual student, evaluation for educational decision making, curricular materials compatible with IGE, home-school-community relations, facilitative environments for IGE, and the continuing research and development required to renew the educational system. These basic components are shown in Figure 2.

The multiunit organization was designed to produce an environment in a school building which facilitates instructional programming for the individual student and the introduction of other components of IGE. The multiunit school organization structure replaces the age-graded, self-contained classroom organization for instruction and the related administrative relationships. The Instruction and Research (I & R) Unit replaces the self-contained classroom organization for instruction. The Instructional Improvement Committee (IIC) comprised of the principal and the unit leader replaces the principal as the sole educational decision maker at the building level. The Systemwide Program Committee (SPC) is a new organizational

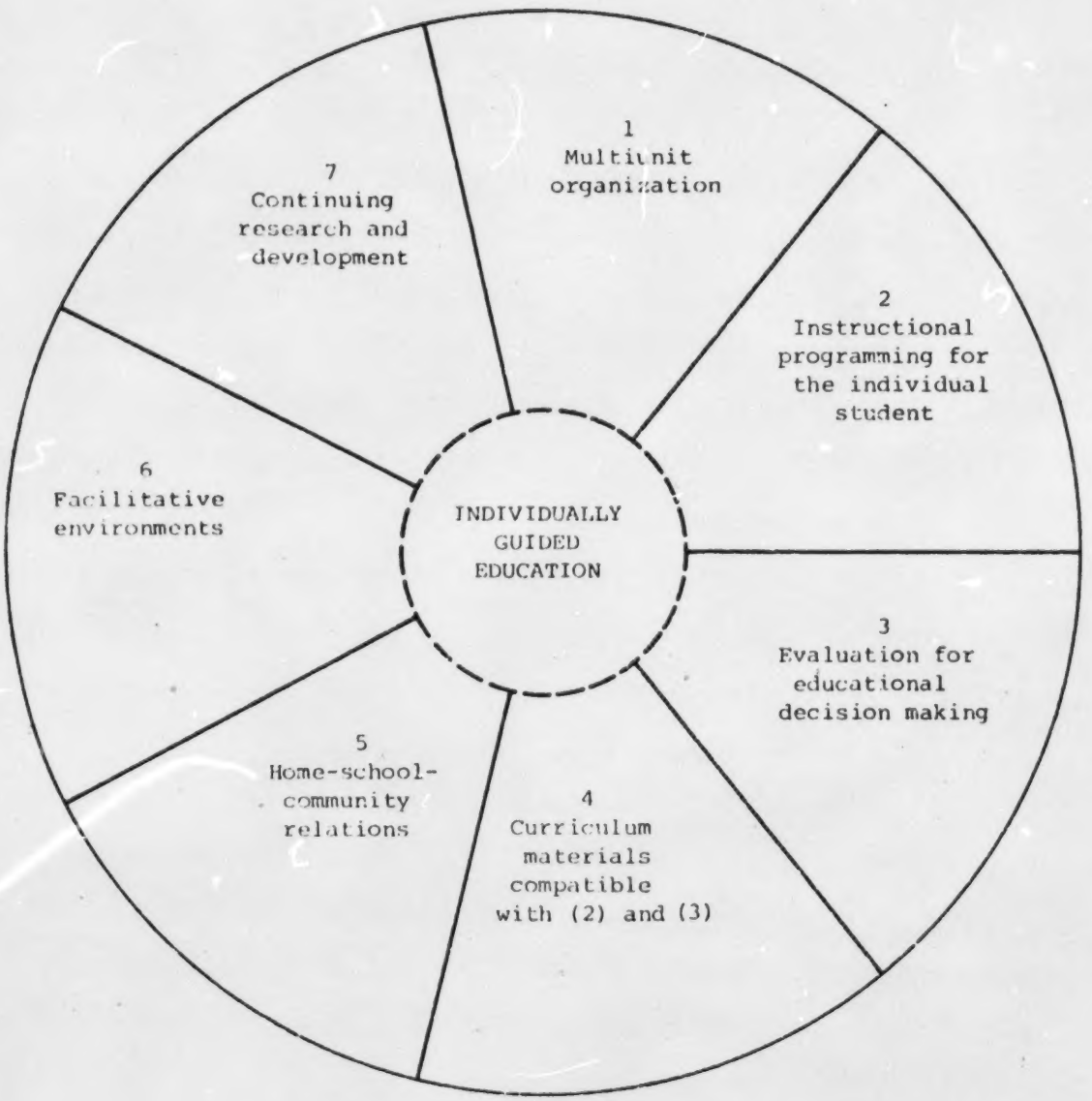

Figure 2. Major components of Individually Guided Education. Based on Klausmeier, Quilling, Sorenson, Way, & Glasrud, 1971. Chapter 2.

arrangement at the school district level. These three groups assume responsibility for planning, decision making, and evaluation at the three respective levels and also for communication within the school setting and between the school and the community.

Adapting instruction to the needs of the individual is essential for improving the quality of education. To attain this aim of IGE, a model of instructional programming (IPM) was conceptualized to facilitate each student's development in the cognitive, psychomotor, and affective domains (Klausmeier, Sorenson, & Quilling, 1971). This model specifically takes into account each student's beginning level of performance, rate of progress, style of learning, motivational level, and other characteristics in the context of the educational program of the school.

Evaluative information too often has been gathered to compare individuals and groups rather than to plan and carry out good instruction for individual students. As a result, it has been done after an instructional sequence is completed rather than before it is started and during the sequence. In IGE the evaluation of the student's learning characteristics and achievements is aimed at providing information at three times: (1) at the beginning of a unit of instruction, (2) during the instructional sequence, and (3) at the end of a unit of instruction. Thus, the third major component of IGE is a model of evaluation leading to decisions which will facilitate student learning through use of instructional programming for the individual student.

The success of IGE and other forms of schooling depends heavily on the availability of curricular materials compatible with instructional programming for the individual student and the availability of appropriate evaluative procedures. Curricular materials, whether developed for IGE or any other instructional system, should incorporate four main attributes (Klausmeier, 1975). First, the content incorporated in the material should be accurate and reliable. Second, the content should be learnable by the particular students for whom it is prepared. Third, the materials should be suitable in terms of cost, attractiveness, and the amount of inservice teacher education required. Fourth, the materials and related activities should be teachable. To be compatible with instructional programming for the individual student, teachable materials in any curricular area should include (a) clearly stated instructional objectives; (b) assessment tools and procedures directly related to each objective that will aid teachers in the initial, formative, and summative evaluations of student learning; (c) print and nonprint instructional materials that will enable students to attain each objective; and (d) suggestions to teachers concerning possible instructional activities that effectively combine the use of the materials with student and teacher activities. This last attribute of curricular materials assumes that each teacher, in order to attain any particular objective that may be common for students, must be able to vary the instructional activities for particular students in order to provide for individual differences.

The success of any IGE school depends in a large measure on an active program of home-school-community relations. Three general aims of a home-school-community relations program are that the staff is aware of available resources and is responsive to the educational expectations of the community, parents, and students; the community, parents, and students are aware of and responsive to the requirements for implementing IGE; and both staff and community are involved in the changeover and refinement of IGE.

A system of supportive and facilitative environments is required to maintain and strengthen each IGE school so that, in fact, each school becomes increasingly self-renewing. Facilitative environments, consisting of human and material resources, are both intraorganizational and extraorganizational. The intraorganizational environment is represented in the multiunit organizational structure and the focus is on providing the physical and material resources needed for learning and instruction. Extraorganizational facilitative environments are represented in the state education agency, intermediate educational agencies, teacher education institutions, and other groups such as teachers' associations and parents' organizations.

The seventh and final component of IGE, a program of continuing research and development, ensures the continuous improvement of IGE. Without this component, IGE--any any other form of schooling--will become sterile, unresponsive to the changing nature of society, and incapable of adapting to the needs of individual students

(Klausmeier, 1972). Thus, an IGE school is one that attempts to incorporate these seven components and their interrelationships into a total system of schooling.

Judging the Value of IGE

To develop an evaluation plan for IGE, four principles have been followed to judge the value of IGE.

1. Pupil outcomes should be the initial basis of an IGE evaluation. As Klausmeier stated

> Students, upon completing IGE elementary schooling, should have achieved higher than in other kinds of schools, should have achieved conceptualizing skills and other abilities which enable them to continue to learn, and also should have healthy self-concepts [Klausmeier, 1976, p. 7].

The extent to which these outcomes have been attained must be the basis of the evaluation plan.

2. The instructional means or form of formal schooling must be a second basis of an IGE evaluation. It has been fashionable in evaluation circles to concentrate on ends or outcomes and to ignore the means by which they are reached. It has been persuasively argued in traditional circles that means are, by definition, the optional routes to fixed goals. These optional routes are of no significance in and of themselves, but only in terms of the contribution they can make to those ends (Olson, 1976). Yet, the form of formal

schooling is distinctive, as Bruner (1966) has claimed: schooling occurs out of the context of activity. Reform movements invariably attack the properties of means--schooling should be more in context and learning should occur by doing. IGE is an educational reform in part aimed at changing the means of instruction. To this extent judging the value of the means is as important as assessing outcomes.

3. Staff outcomes should be a third basis of an IGE evaluation. If changed pupil outcomes are a result of changed pupil activities, then it follows that changed means are in part a result of changed teacher activities. One established fact in IGE schools is changed staff roles. The extent to which staff changes are reflected in increased knowledge about individuals and schooling or in changed attitudes and values should also be reflected in an IGE evaluation plan. In fact, if IGE is as dynamic as is claimed, then the evolution of a staff to an increasingly professional approach to solving the problems of educating children should be evident.

4. The degree to which the supportive systems of IGE have been incorporated and developed in a school must be judged. The seven components of IGE have evolved as practical features of IGE schools in order to support new instructional methods which in turn produce desired pupil and

staff outcomes. It can be argued that the efficiency of an IGE school is a function of which components have been implemented and how well they are operating. In fact Klausmeier (1976) claimed that

> High quality instruction is realized in IGE schools when conditions such as the following are operative: clearly defined roles and responsibilties, shared decision making, continuous pupil progress, personalized instruction, active learning, objective-based evaluation, involvement of parents and support from the community, and support by responsbile education agencies [pp. 8-9].

Summary

Yearly increases in the number of schools implementing IGE added to the array of schools that have used components of the system for many years have brought forward demands for evidence of the effectiveness of the system in various settings and in various phases of implementation. Although evaluations have been carried out in many settings on many aspects, no overall evaluation has been carried out.

As a comprehensive system of education, IGE is directed toward the development of self-direction and motivation for learning in students as well as different levels of achievement. Further, the components are directed toward school staff and community members in addition to changing what students do. Thus, evaluation of an IGE school must go beyond pupil outcomes or ends. It must encompass staff outcomes, the instructional means and the degree of implementation of IGE. If an evaluation plan can encompass all these aspects, then the features which have made IGE schooling successful should be identified.

II

AN OUTLINE OF THE EVALUATION PLAN

Based on the ideas discussed in Chapter I, it should be apparent that three things are needed: First, a descriptive framework that considers outcomes of IGE as a function of instructional means and of the degree of implementation; second, a plan that is consistent with the powerful flexibility of IGE and yet financially feasible: and third, a body of supporting instrumentation and techniques to be used in carrying out the plan.

A Descriptive Framework

The diagram presented in Figure 3 is intended to show four types of variables and how they are functionally related.

Outcomes have been separated into pupil and staff outcomes. Both sets of outcomes are illustrated as being multivariate and multilevel. Pupil outcomes include achievement in both reading and mathematics, cognitive skills such as conceptualizing and problem solving, and self-direction. Staff outcomes include knowledge of IGE principles related to individual differences and instruction using the instructional programming model, attitudes about children and schooling, and perceived values of education.

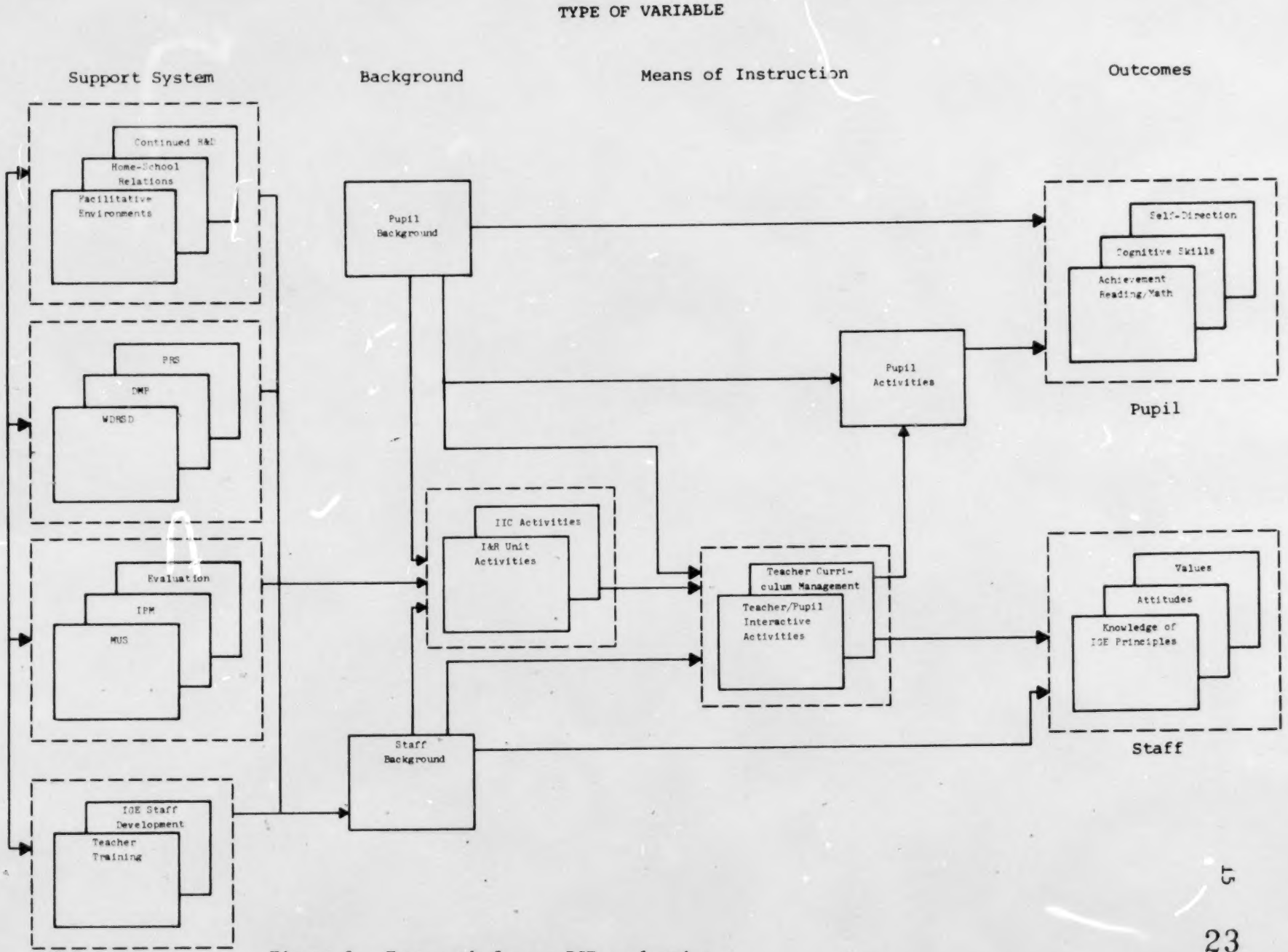

Figure 3. Framework for an IGE evaluation.

Means of instruction have been separated into three sets of activities based upon the operating characteristics of IGE schools; namely, the staff activities of the IIC (Instructional Improvement Committee) and the I & R Unit (Instruction and Research Unit), the activities of the staff teacher (both curriculum management and pupil interaction), and activities of pupils.

The support systems for an IGE learning environment have been separated into four categories. The first which includes IGE Components 1, 2, and 3 (the multiunit organization, instructional programming, and evaluation) is seen as most directly related to the means of instruction. The second category, Component 4 (curriculum materials compatible with Components 2 and 3), is shown in the figure by identifying the three major curriculum products developed for IGE: namely, The Wisconsin Design for Reading Skill Development (WDRSD), Developing Mathematical Processes (DMP), and the Pre-Reading Skills Program (PRS). At least one such curriculum program (not necessarily these) is deemed essential for an IGE school to operate. The third category which includes Components 5, 6, and 7 (home school relations, facilitative environments and continued research and development) is seen as desirable. These support systems are less directly related to instructional means than the other components. However, they should influence the degree to which the other components have been adopted, and, in particular, should directly affect the amount and quality of IGE staff

development activities. The final category of support systems includes the teacher training and IGE staff development programs.

The fourth type of variable shown in Figure 3 is pupil and staff background. These variables were not previously mentioned but have been included because knowledge of prior pupil achievement, level of motivation, and learning styles are assumed necessary for efficient grouping of students and selection of appropriate activities. Similarly, staff experience with IGE principles, with working in groups, and with pupils should be important.

The functional relationships illustrated in Figure 3 are intended to convey the following: The degree of implementation of the IGE support systems along with pupil and staff backgrounds directly influence the means of instruction in an IGE school. The means of instruction, along with pupil and staff backgrounds, account for pupil and staff outcomes.

Structure of the IGE Evaluation Plan

Given that there are limited resources to examine the framework of variables described above, that instruments or techniques are not readily available to scale reasonable proxy variables for each category or subcategory of variables, and that the various relationships depicted in the framework call for different analytic strategies (status surveys, time-series designs, within-school and between-school comparisons, etc.), the following guidelines have been adopted to insure that a reasonable portrayal of IGE schooling can be obtained.

1. The evaluation should begin by identifying and getting the cooperation of a large number of IGE schools. A population of approximately 950 IGE schools was identified in the spring of 1976, about 770 of which have both second- and fifth-grade students. A stratified sample of approximately 100 schools is to be drawn. Stratification will be done on demographic and IGE support characteristics to insure a wide variability of schools and situations.
2. The evaluation should limit its examination to teachers and students at the IGE equivalents of second and fifth grades. Second grade is the earliest at which group-administered paper-and-pencil tests can be given to children; fifth grade is the last common grade in elementary schools.
3. The evaluation plan should project the preparation of an instrumentation survey identifying available self-report survey and paper-and-pencil test instruments to be used to scale reasonable proxy variables for as many categories of variables as is possible for the total population. Thus, resources should not be expended on instrument or test development for use with the total population.
4. The evaluation plan should project the preparation of analysis plan to be followed on the baseline data gathered on the 100-school sample. The plan should be

based on a structural equations model which accounts for both within-school and between-school variance.

5. The evaluation plan should project the preparation of several follow-up studies designed to gather other data over a longer period of time on subsamples on the original population.
6. The evaluation plan should include provisions for the R & D Center subcontracting through competitive bidding the 100-school-sample data gathering and other follow-up studies for which the Center does not have adequate staff.
7. The evaluation plan and its execution should be monitored by the Center IGE evaluation staff with the assistance of an IGE Evaluation Advisory Panel.

By following these guidelines, it is assumed that the evaluation to be carried out will provide an adequate examination of the relationships among variables as described in the framework and at the same time be flexible in its approach to the study of IGE schooling. From this study the features which have made IGE a successful innovation in American elementary education should be identified.

Outline of the Plan

The evaluation of IGE has been separated into four phases. The first phase will be a large sample investigation whose purposes are:

1. to determine the degree to which the seven components of IGE have been implemented
2. to ascertain the relationship of degree of component implementation to means of instruction
3. to ascertain the relationship of degree to component implementation of staff outcomes
4. to ascertain the relationship of degree of component implementation to pupil outcomes

It is this large sample study that will provide the basic information about IGE schooling. Because of the size and scope, it will be initiated according to the timeline which appears in Figure 4. The initial item in that figure refers to a document to be prepared by the R & D Center staff prior to subcontracting the Phase I Evaluation. This first document will detail the school sampling plan and instruments to be used to gather the large sample base-line data (completion date by November 1, 1976). This document will specify the following information: First, for each variable one or more proxy variables will be identified. For example, for the variable, pupil mathematics achievement, the proxy variables computation, concepts, applications, and problem solving, have been identified. Similarly, productive learning time, appropriateness of activity, and level of motivation have been identified as proxy variables for pupil activities.

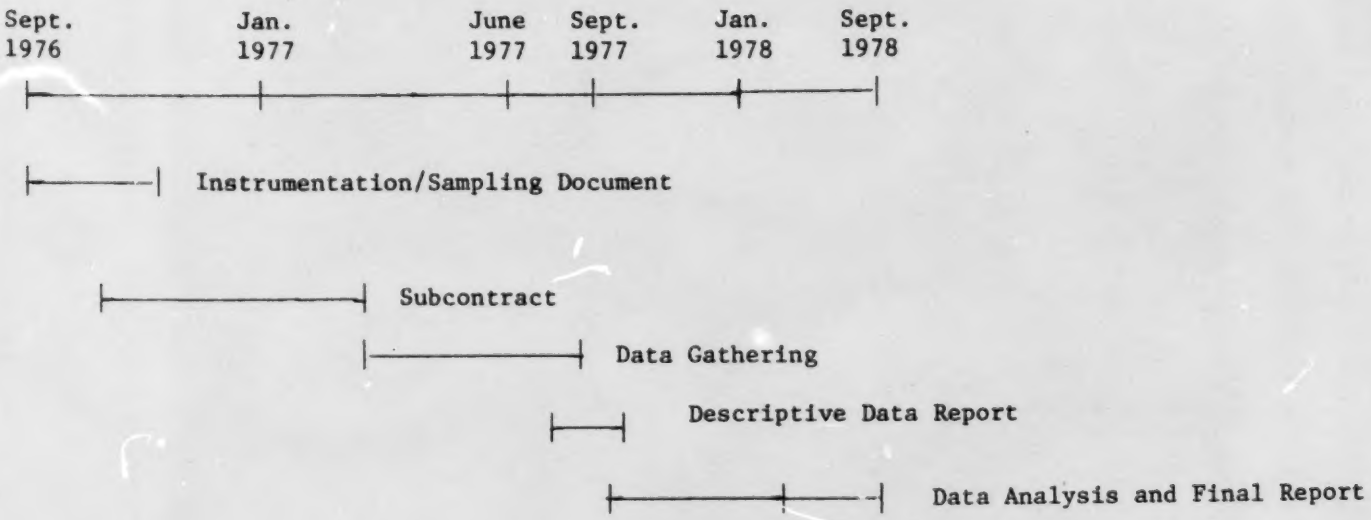

Figure 4. Timeline for IGE Evaluation: Phase I--large sample survey.

Then, one or more instruments will be described which are to be used to scale that proxy variable. For example, The Comprehensive Tests of Basic Skills (1975) will be used to scale pupil computation, concepts, and application performance.

The second item in the figure is a solicitation for a sub-contract to carry out the large sample study. This is to be prepared starting October 1, 1976, reviewed and bid by December 15, 1976, and awarded by March 1, 1977. Data are to be gathered by July 1, 1977, and data summarization carried out and reports written by October 1, 1978. The final aspect of this phase will be an extensive analysis of the 100-school-survey data. A document outlining the analysis to be followed will be prepared by June 1, 1977. Analysis of the data and reporting findings will proceed thereafter and be completed by September 1, 1978. This analysis will be conducted by Center staff under the direction of Professor Gary Price.

The second phase will be a small sample (30 schools) follow-up investigation whose purposes are:

1. to determine the validity of the self-report data gathered in the large sample study
2. to use interview and observation data to extend the information about each category of variables
3. to gather cost data so that some indications of cost effectiveness can be determined

This validity-extension study will be carried out to clarify and fill out the knowledge gained in Phase I about the variables and how they are relating in IGE schooling. The timeline for this phase appears in Figure 5. Planning for this phase will begin as soon as the instrumentation document for Phase I is completed. Plans for gathering of cost data will be carried out under the direction of Professor Richard Rossmiller. This phase will also be subcontracted (during Spring 1977) and data are to be gathered during the school year 1977-78. The analysis should be done and reports written by October 1978.

The third phase will also be a small sample (15 schools) investigation using a subsample of Phase I schools. The purpose of this study are:

1. to determine the degree of reform evident in IGE schools
2. to determine the degree of renewal evident in IGE schools

This reform-renewal study will be a sociological investigation of IGE schools.

The question being asked is: Has the IGE view of schooling permeated the structure of the classroom? It would appear that there has been a tradition in which routines, subjects, facts, techniques, and desirable behavior patterns serve as scripts for teaching. In a review of the 1970 Carnegie Commission Report, William K. Stevens wrote that

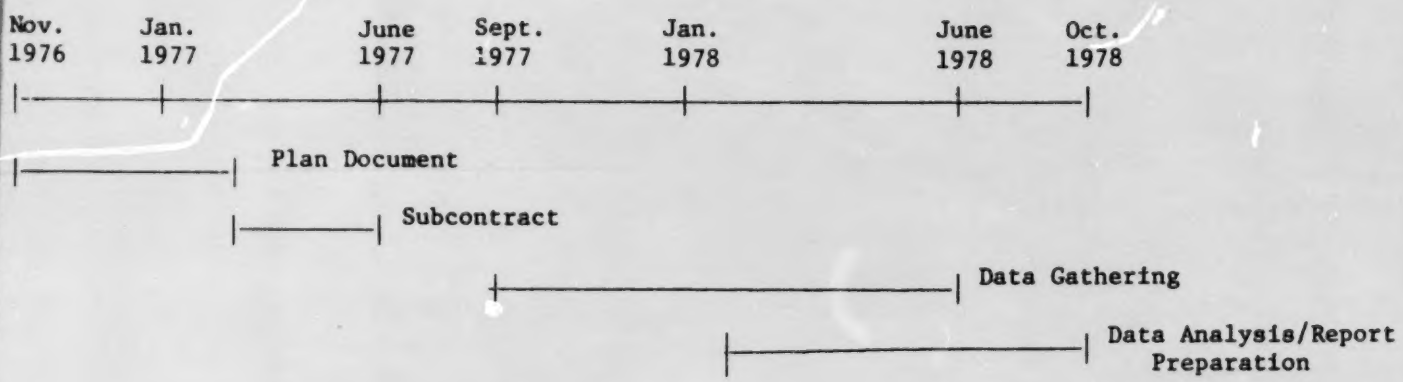

Figure 5. Timeline for IGE evaluation: Phase II--validity/extension study.

> most schools are preoccupied with order, control and routine for the sake of routine; that students essentially are subjugated by the schools; that by practicing systematic repression, the schools create many of their own discipline problems; and that they promote docility, passivity and conformity in their students . . . .
>
> The teachers are said to be treated as subserviant employees whose job is to take orders and punch the time clock every day, and whose competence is judged not by what and how their students learn, but by how well they control their classes . . . . Teachers assume that pupils cannot be trusted to act in their own best interests . . . and principals make similar assumptions about teachers . . . . Teachers become primarily disciplinarians, and discipline is defined as "the absence of noise and movement." . . . One result of all this . . ." is to destroy students' curiousity along with their ability--more serious, their desire--to think and act for themselves". . . It is not the children who are disruptive . . . it is the formal classroom that is disruptive--of childhood itself [pp. 5-7].

The insidiousness of the "hidden school curriculum" lies not so much in its overt rules and constraints, but rather in the potency of its invisible nature whereby all participants in the educational process implicitly accede to its tacit demands. These demands or tacit assumptions may include or define the nature of the expectations of student and teacher as determined by the physical environment, the nature of the valuing of what it is that is important to "know," the nature of the process of the communication of information, the nature of the social power structure, and finally the nature of the economic or social valuing of education as a commodity.

Early in the development of IGE, Klausmeier made explicit how an IGE school in the future would operate in contrast

to the current elementary schools (Klausmeier, Morrow, & Walter, 1967). Implicit in the contrast was the expectation that the "hidden school curriculum" would be changed. Thus, IGE schooling is indeed a real reform and not just a new system to routinize or legitimatize current practice. To those investigators who have worked in IGE schools, there is subjective evidence that in some schools real reform has occurred while in others with some superficial IGE trappings, the old subserviant environment still prevails.

A part of reform is renewal. That is, as a school evolves from the traditional environment to one with new structure and values, the participants sense and participate in activities which renew or update their knowledge, skills, or values. Becoming an IGE school is more than changing surface characteristics. It is changing one's ideas about schooling. Such changes are evolutionary and involve the active searching for new information, new processes, etc.

In particular, this phase will concentrate on particular schools regarded as successful. A document outlining the plan for this phase will be prepared by April 1977. Data will be gathered in the 1977-78 school year. This phase will be conducted by Center staff under the direction of Professor Thomas Popkewitz.

The fourth and final phase of this plan will be another small scale study focusing on the use and effectiveness of the three primary curricular projects developed at the Wisconsin Research and Development Center for Cognitive Learning, the Wisconsin Design for Reading Skills Development (WDRSD), the Developing Mathematical Processes (DMP), and the Pre-Reading Skills Program (PRS). Each program was developed to be compatible with the IGE system and incorporates two of the components of IGE, the model of instructional programming and the model for evaluation.

The Wisconsin Design for Reading Skill Development is an objective-based system designed to manage the development of reading skills for children in grades kindergarten through six. The components of the WDRSD are: skills and objectives, assessment materials, instructional resources, and management techniques and materials. Approximately 5,000 schools are in various stages and degrees of implementation of the WDRSD. A more detailed description of WDRSD is given by Otto (1976).

Developing Mathematical Processes (DMP) is a complete instructional program for elementary mathematics, grades kindergarten through six. The printed materials used in the DMP program are: resource manuals, teacher's guides, student booklets, student guides, printed materials kit, physical materials kit, pre-assessment package, topic inventories, and pupil performance records. More than 400 schools are

using various parts of the program. A more detailed description of DMP is given by Romberg (1976).

The Pre-Reading Skills Program (PRS) is designed to provide instruction in pre-reading skills at the kindergarten level. PRS teaches five basic pre-reading skills: attending to letter order, attending to letter orientation, attending to word detail, sound matching and sound blendings. The components of the program are: criterion-referenced diagnostic tests, a schedule book, a resource file, a management system, a set of teacher's guide folders, and multiple copies of classroom games and manipulations. PRS is being used in approximately 2000 classrooms. A more detailed description of PRS is given by Venezky and Pittelman (1976).

All three programs, WDRSD, DMP, and PRS, underwent extensive evaluations and field tryouts in their formative stage. Information was gathered from content and measurement experts, teachers, and evaluators. The major elements of the programs were completed by fall of 1976 and are either in publication or in use.

Now that WDRSD, DMP, and PRS are fully implemented summative questions need to be answered. The sound structure of the developmental processes and formative evaluations provide a solid base from which to inquire about such questions.

Studies have been performed for each of the three programs that indicate parts of the programs are effective. Questions still remain about the effectiveness of the total programs and how students are prepared for future learning.

Each program is being used by a number of schools throughout the country in a variety of ways. For example, each program is being used in both IGE and non-IGE schools. Exactly, what is the capability of each program to be used effectively in a number of different situations is unknown.

Phase IV of the IGE evaluation has two major purposes:

1. to describe how WDRSD, DMP, and PRS are being implemented and what their effects are
2. to compare the use and nonuse of these programs within IGE and non-IGE settings

Although Phase IV will be summative in nature, information collected will help to make changes in the materials, the instructional programming model, and teacher training procedures.

The goals of Phase IV of the IGE evaluation are:

1. to determine the effects of WDRSD, DMP, and PRS on mastering content
2. to determine whether WDRSD, DMP, and PRS meet their design objectives
3. to identify how WDRSD, DMP, and PRS are being used
4. to identify what management procedures and teacher behaviors are being used
5. to identify how the school setting, IGE or non-IGE, relates to the effectiveness and administration of WDRSD, DMP, and PRS

6. to identify pedagogical-pyschological problems which need more thorough investigation

Phase IV will be divided into two data collection periods. The first period, Descriptive Study, will be during the school year 1977-78 and will involve a sample of schools for each of three programs. The second period, Comparative Study, will be during the next school year, 1978-79, and will involve an expanded sample of schools for WDRSD and DMP to include IGE and non-IGE schools not using either program. PRS will not be included in the Comparative Study.

Matched-pairs of WDRSD schools, matched-pairs of DMP schools, and matched-pairs of PRS schools will be selected for the Descriptive Study. Each pair of schools will contain one IGE school and one non-IGE school. The schools within pairs will be matched on demographic and other external variables.

The Comparative Study will use some of the same schools as were used in the Descriptive Study. In addition, IGE and non-IGE schools not using WDRSD and DMP will be added to the sample. The sample of schools will be selected so an equal number of schools is represented from each of these four groups:

1. the IGE Unit using WDRSD (DMP) materials
2. the IGE Unit using materials other than WDRSD (DMP)
3. the Standard Class using WDRSD (DMP) materials
4. the Standard Class using materials other than WDRSD (DMP)

Two levels of instruction will be used, one level from grades 1, 2, and 3 and one from grades 4, 5, and 6.

The purpose of the Descriptive Study is to collect descriptive information about how WDRSD, DMP, and PRS are being used and what their effects are. Student baseline data will be collected during September. Teacher questionnaires, teacher record forms, teacher interviews, and classroom observations will be conducted during the year. In May students will be tested on self-concept, achievement, and other cognitive variables. Two types of achievement measures will be used. One will be criterion-referenced tests that will be specific to the content objectives of the programs. The other will be standardized achievement tests.

The prupose of the Comparative Study is to study in more detail the use of WDRSD and DMP in some of the schools used in the Descriptive Study and at the same time compare these schools with IGE and non-IGE schools which are not using either program. The Comparative Study will provide information about the necessity of using WDRSD and DMP as part of the support system for IGE schools and how the effects of these programs differ from other alternatives.

The planning, instrument selection, and sample selection will be done during the winter and spring of 1977. During the summer of 1977, on-site liaison personnel will be selected and trained to administer instruments and conduct classroom

observations. Data will be analyzed during the summer and into the fall after each study. Two major reports will be written, one for WDRSD and one for DMP during the fall of 1970. A shorter report will be written for PRS.

Summary

As envisioned, this IGE evaluation plan should provide NIE, the R & D Center, current IGE schools, potential IGE schools, and the education profession with a comprehensive picture of IGE in action. The 100-school survey which examines the relationships among the categories of variables described in the framework should provide baseline data about IGE schooling. The small sample studies then should add information and clarify relationships. We should be able to weave the findings from the four phases together so that a comprehensive picture of IGE emerges. This picture should illuminate the features that have made IGE a successful reform movement in American education.

III

THE IGE EVALUATION PLAN IN PERSPECTIVE

The purpose of this chapter is to relate the plan being proposed to the voluminous current literature on evaluation. In particular, four perspectives on evaluation are briefly discussed and the IGE plan related to each.

Types of Evaluation and Standards

Ever since Cronbach (1964) and Scriven (1965) made the distinction between "formative" and "summative" evaluations in the literature, authors have vied to identify and clarify types, phases, sequences or standards, and to develop checklists. For example, Romberg (1976) identified four phases in the evaluation of the mathematics program developed for IGE: namely design evaluation, formative evaluation, implementation evaluation, and summative evaluation (see Figure 6). The labels were chosen to emphasize the fact that different questions were raised at different times in the development of that program. To answer the questions, different information needed to be gathered in different ways. A total product evaluation encompasses all such questions.

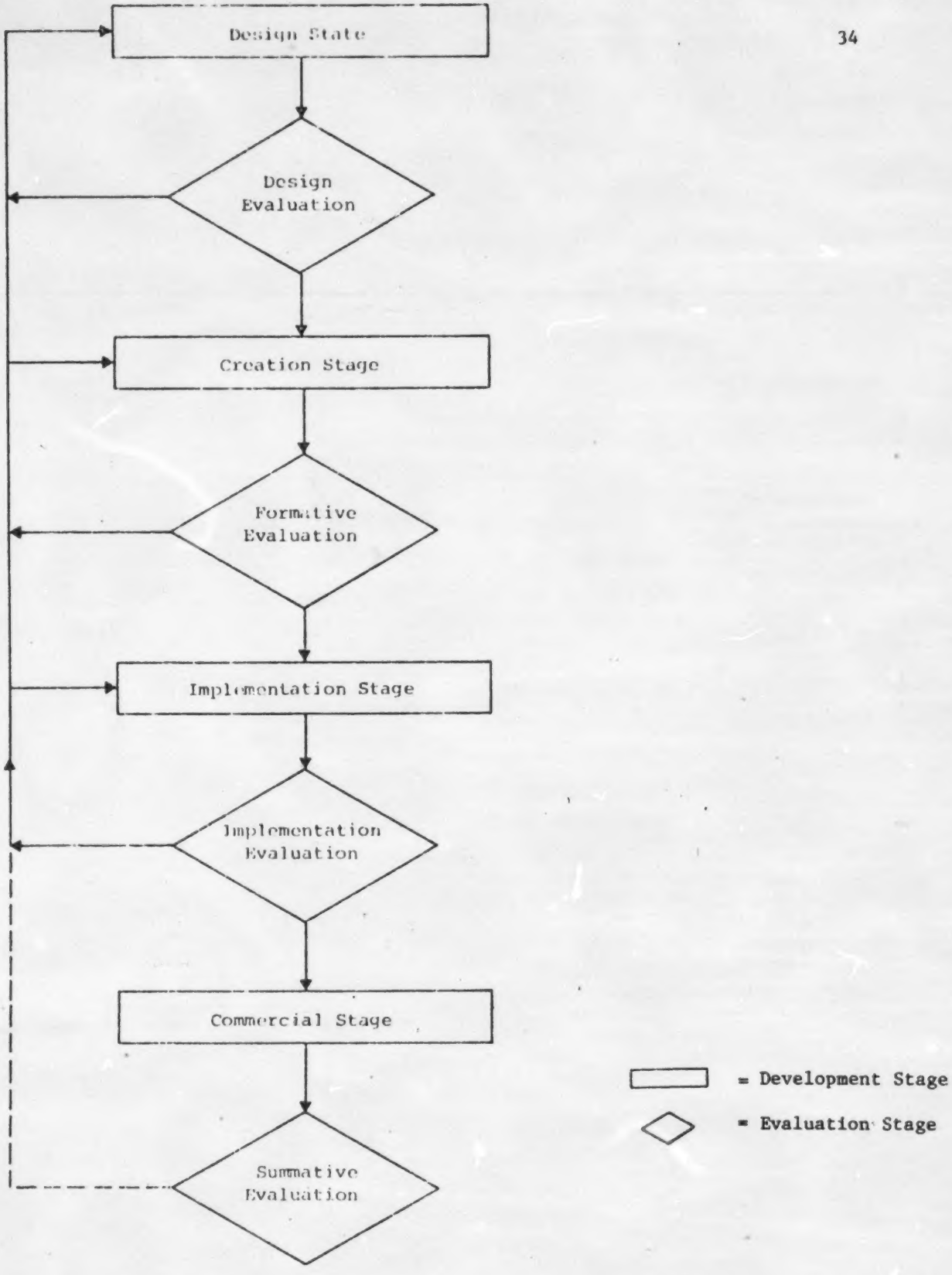

Figure 6. Four stages in developing and evaluating DMP.

Scriven has carried this differentiation further in his "Product Evaluation Profile (PEP)" (Scriven, 1974). He argued that every product should be rated on 13 items and even suggested criteria for rating each item on a five-point high/low scale. The 13 items he identified are:

1. Need (justification)
2. Market (dissemination)
3. Performance--true field trials
4. Performance--true consumer
5. Performance--crucial comparisons
6. Performance--long term
7. Performance--side effects
8. Performance--process
9. Performance--causation
10. Performance--statistical significance
11. Performance--educational significance
12. Costs and cost-effectiveness
13. Extended support

Unfortunately, the proposed IGE evaluation will not fit neatly into any such scheme. Romberg's sequence and Scriven's PEP both are applicable primarily to curricular products and not to a complex program such as IGE. But, the IGE evaluation plan is consistent with the notion that there are different questions which need answers. Thus, the different phases of the plan require different

kinds of data, different designs, different methods of analysis, and different reports of results.

Evaluation as Decision-Making, Demonstration, or Reflective Inquiry

Webster's Dictionary defies evaluation as the procedures one uses "to judge or determine the worth or quality of." But what is the purpose of judging the value of anything?

Stufflebeam for the Phi Delta Kappa National Study on Evaluation stated that "the purpose of evaluation is to provide information for decision making [1970, p. 2]." He further stated that

> These decisions may be divided into four classes called planning, structuring, implementing, and recycling decisions. Planning decisions pertain to the selection of objectives. Structuring decisions are those involved in designing projects to achieve stated objectives. Those required for operationalizing and executing a project design are referred to as implementing decisions, and recycling decisions refer especially to the judgment of and reaction to project results [p. 1970, p. 2].

From this perspective, the decisions to be made should be specified a priori by the investigator. Then, the design, data, and analytic procedures are specified in light of those decisions.

For the variety of teacher training projects funded by National Teacher Corps, Romberg and Fox (1976) identified demonstration as the purpose of an evaluation study. They stated

> The purpose of demonstration is to communicate to those not originally involved with a particular program the salient features of the program. The overriding question is: What does an outsider have to know to try some of the specific features of the training strategy in another setting? Thus, the special challenge of demonstration can be stated as "describing the successes and failures of specific features of a training program for possible replication at other sites [p. 2]."

The salient demonstratable features of a program likely cannot be identified prior to initiation. Thus, from this perspective the design, data, and analytic procedures must evolve during the development and implementation of the program.

Parlett and Hamilton (1972) argued that, since innovative educational programs are vulnerable to manifold extraneous influences in the real milieu of schools, an alternative methodology which they have labeled "Illuminative Evaluation" should be followed. They stated

> illuminative evaluation takes account of the wider contexts in which educational programs function. Its primary concern is with description and interpretation rather than measurement and prediction. It stands unambiguously within the alternative anthropological paradigm. The aims of illuminative evaluation are to study the innovatory program: how it operates; how it is influenced by the various school situations in which it is applied; what those directly concerned regard as its advantages and disadvantages; and how students' intellectual tasks and academic experiences are most affected. It aims to discover and document what it is like to be participating in the scheme, whether as teacher or pupil; and, in addition, to discern and discuss the innovation's most significant features, recurring concomitants, and critical processes [pp. 8-9].

In this perspective evaluation becomes reflective inquiry. No longer are "decisions to be made" or "features to be demonstrated" of primary concern. Now the investigator shifts methodologies from psychological to sociological paradigms.

It should be obvious, given the framework for the IGE evaluation and the proposed phases, that reflective inquiry is at the heart of this plan. We hope to uncover some of the

strengths and weaknesses of IGE schools in practice and to identify the intended and unintended consequences of IGE schooling. The information generated and relationships studied should be a rich source of ideas for further investigation. However, it is hoped the findings would help school staffs and funding agents make reasonable decisions in the future, such as whether to implement IGE, or whether to fund further investigations. Similarly, one could reasonably anticipate that demonstratable features of successful IGE schools could be identified and later incorporated in the programs of other schools.

The Relationship of Evaluation to Development and Implementation

The problems involved in evaluation of IGE schools are in part due to the problems of implementing any innovative program in a social institution which has proven to be extremely resistant to change.

The literature on planned change is wide in scope and vast in quantity. Havelock (1969) reviewed approximately 4000 sources in his analysis of the theoretical concepts and the research evidence dealing with change in education, agriculture, medicine, and other fields. Many authors have attempted to provide a model or conceptual framework for planned educational change.

The many models of the change process can be grouped into three main classes. The research-development-diffusion perspective, associated particularly with Guba (1968), is characterized by a

rational sequence of coordinated activities, a division of labor, and a rather passive target population. Evaluation in this "center to periphery" notion of development and implementation focuses on whether the user at the periphery has adopted and is using correctly the products developed at some central setting. This model is often criticized for taking too little account of the users' needs. Also, it fails to emphasize the importance of schools and other client systems in generating worthwhile problems for research and development, as Klausmeier (1968) and Romberg (1970) have pointed out.

The social interaction perspective is basically sociological in nature, and considers the path taken by an innovation already in existence as it moves through a social system. This model emphasizes characteristics of innovators (Rogers, 1965) and theories of rejection (Eicholz, 1963) as well as adoption. Weaknesses of this model include its lack of concern about how the innovation is developed and about the adaptions the user may make.

The third major type of model for the change process views the user as a problem solver. The points stressed by the problem-solver perspective are (1) starting with the user's need and its diagnosis, (2) providing non-directive help from outside, and (3) encouraging the user to develop his own internal resources and his capacity for self-renewal. This model is closely associated with the human relations tradition of planned change.

The main drawbacks of this perspective, according to Havelock (1969), are that it puts great strain on the user, it minimizes the importance of outside resources, and it cannot be implemented on a massive scale.

The IGE implementation strategy has attempted to combine aspects of both the research-development-diffusion perspective and the user-as-problem-solver perspective. The adoption of the IGE support system is seen as necessary structural features which makes it possible for school staffs to solve the problem of how to differentiate instruction in an efficient and effective manner. MUS or the IPM are not "teacher-proof"; instead they are mechanisms to facilitate professional judgments. In fact, teacher and pupil activities should be different for different staffs and pupils. From this it should be evident that variation is anticipated both in a school and between schools and that estimates of both within-school and between-school variances are important. Thus, the evaluation plan not only includes estimates of the degree of IGE component implementation and of pupil and staff outcomes, it also attempts to estimate the differential quality of instruction.

Overcoming Impediments

David Berliner in his recent paper titled "Impediments to the Study of Teacher Effectiveness" (1975) identified an extensive list of problems facing researchers who are examining

the relationships between teacher behaviors and pupil performance. In this rather pessimistic overview, he examined what researchers have done in the field of teacher effects research. The IGE evaluation plan was not designed to overcome all the problems he identified. Comments need to be made about the three major categories of impediments, namely instrumentation, methodology, and statistics.

Clearly, the instruments one uses in any kind of research are extremely important. Researchers examining teacher effects have typically relied very heavily on objective tests. The stereotype investigator steps into the school environment quickly, gathers a variety of survey data, steps out and spends most of his time, effort, and resources analyzing that data. The primary criticism of this approach is that there is little understanding of what the data mean. Some critics of this empirical approach would dismiss all such data and turn to case studies as an only sensible way of gathering sensible data. For the IGE evaluation, we have combined both approaches. First, we propose to collect objective test data on as many variables as possible. But, we are not relying solely on that information to weave a picture of IGE in action. Phases II, III, and IV of the plan are designed to give meaning to the variables and relationships among variables in the IGE framework. The practicality of combining both objective and subjective

techniques in evaluation has been demonstrated by Fox, et al. (1976) in a recent evaluation of Teacher Corps Training Institute.

A second problem in instrumentation has been the quality of instruments. Poor scaling methods have been used for inadequately conceived proxy variables for important conceptual variables in many studies. While the IGE evaluation plan cannot overcome all of these problems with the resources available, we have attempted to identify multivariate-multilevel outcomes and use more than one instrument to scale each of the proxy variables. In addition, the extensive information gathered in Phases II, III, and IV should give us clues about the inadequacies of various instruments in the study.

The primary methodological problems that Berliner identified are: (1) the inadequate framework for the conceptualization of teacher tasks, and (2) the assumed direct relationship between teacher tasks and pupil performance. For the IGE evaluation plan, we have addressed these problems directly. First, teacher tasks are not seen as initial independent variables. Rather they are interim variables dependent upon the supporting structure of the school organization, teacher background, and pupil background. Second, we have not assumed a direct connection between teacher tasks and pupil performance. We, like Harnischfeger and Wiley (1975), assume that teacher tasks are reflected in pupil activities which in turn are reflected in pupil performance.

Because of the instrumentation and methodology, manipulation of statistical techniques has become a primary area of emphasis. Berliner correctly points out that the procedures used almost always do not adequately meet the requirements of the situation being studied (Berliner, 1975, p. 26). In part, investigators have had to rely solely on statistical techniques to give answers rather than using a combination of statistics and professional inference from subjective techniques. In the IGE evaluation plan, we are aware of these problems. We will be attempting to interpret the information from the studies in light of the limitations of the methodology.

In Summary

The IGE evaluation plan has been conceived in light of the variety of educational evaluation activities of the past decade. We have tried to incorporate some of the best ideas (like the combination of objective and subjective techniques), the most important variables (such as productive learning time in the category of pupil activities or degree of structuring in teacher activities) that other researchers have identified in the past few years. We have tried to put the evaluation plan in an adequate framework. And, we are proposing to use appropriate techniques combined with subjective methods for the examination and interpretation of the data. Together we should be able to identify the characteristics which have made IGE schooling so

successful. In conclusion, given the resources available to carry out an evaluation of IGE, we are confident that the plan will accomplish its objective.

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